



## CASE STUDY (43,000 Cages)

Each individually ventilated caging (IVC) rack draws power for the supply and exhaust blowers to forcing air in and out of the cages and the animal facility needs power to run the fans for the necessary high rate of air changes per hour due to the generation of heat loads from the blowers and from the mice with their odors in the cages. On the contrary, non-motorized exhaust ventilated caging (EVC) rack such as OptiMICE (OM) avoids the use of electricity since they do not have blowers and the animal facility requires a lesser rate of air changes per hour because EVC eliminates animal heat loads and odors by direct exhaust ventilation.

IVC racks are plug-ins that runs 24 hours/7 days. The estimated yearly energy consumption for each IVC cage is about 27.6 kilowatt-hour (kWh) ([www.mousecare.com/Space+Energy.pdf](http://www.mousecare.com/Space+Energy.pdf)). This, times 43,000 IVC cages equal to 1,186,800 kWh of yearly IVC's plug-in energy consumption. Also, each IVC cagerack is designed like a heat sink that transfers equipment and animal heat loads ([www.mousecare.com/IR.jpg](http://www.mousecare.com/IR.jpg)). That necessitates the support from the animal facility of high HVAC (heating, ventilation, air conditioning) requirements to maintaining animal room environmental conditions. The annual energy cost to cooling the heat gain and control the odors from each cage is 4.6 kW. This, times 43,000 IVC cages equal to 197,800 kWh of yearly HVAC energy consumption. That means the total energy consumption for 43,000 IVC cages would be 1,384,600 kWh. According to U.S. EPA, each 1,316 kWh produced by a coal-plant generates 1 ton of carbon dioxide emissions. Therefore, the annual use of 43,000 IVC cages would be responsible for about 1,052 tons of CO<sub>2</sub> dumped into the environment. When building the space necessary to housing IVC cageracks, you must consider the cage density. IVC system requires a linear layout with a maximum cage density of 2.3 cages per square feet (sf). That means, for 43,000 IVC cages you would need to build a minimum of about 18,696 sf just for housing space. In addition to that space, you would need space to store an inventory of HEPA filters and electrical and mechanical parts as well as space for blowers' calibration, maintenance, and service.

EVC racks are not plug-ins but HVAC-assist, local exhaust devices (LED) running along the building's ventilation system. The estimated annual energy consumption from the animal facility HVAC system for each EVC cage is about 5.25 kWh. This, times 43,000 EVC cages equal to 225,750 kWh of yearly EVC's HVAC-assist energy consumption. There are no heat loads and odors generated by such LED cageracks. Therefore, the annual use of 43,000 EVC cages would be responsible for the production of about 171 tons of CO<sub>2</sub>. When building the space to housing carousel EVC cagerack such as the OptiMICE, the cage density would be 5.6 cages per sf. That means, for 43,000 OM cages you would need about 7,680 sf for housing space. There is no need for additional space.

In conclusion, if building a mouse facility with IVC cageracks, you would have a carbon footprint six (6) times higher than housing mice in EVC cageracks such as OptiMICE. Also, you would need 2.4 times more space building with IVC instead of EVC cageracks.